Unit 6 Lesson 5: Building Quadratic Functions to Describe Situations (Part 1)

1 Notice and Wonder: An Interesting Numerical Pattern (Warm up)

Student Task Statement

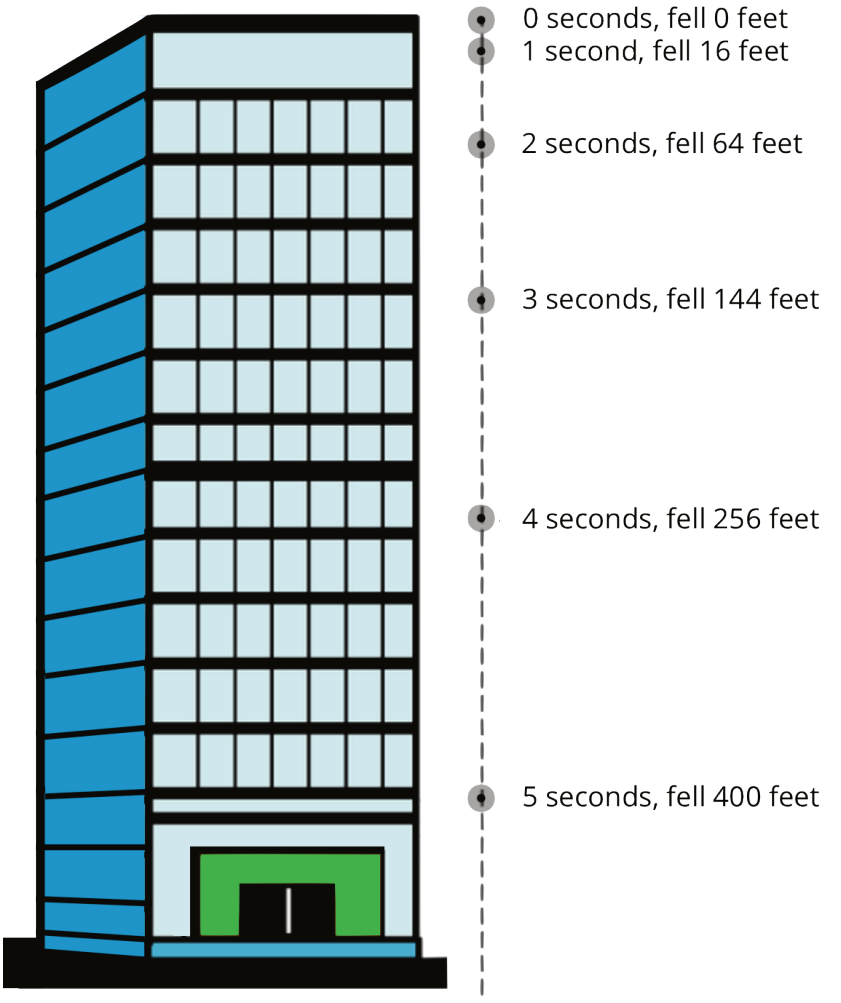
Study the table. What do you notice? What do you wonder?

x	0	1	2	3	4	5
y	0	16	64	144	256	400

2 Falling from the Sky

Student Task Statement

A rock is dropped from the top floor of a 500-foot tall building. A camera captures the distance the rock traveled, in feet, after each second.



1. How far will the rock have fallen after 6 seconds? Show your reasoning.

2. Jada noticed that the distances fallen are all multiples of 16.
   She wrote down:

$$16 = 16 \cdot 1$$
$$64 = 16 \cdot 4$$
$$144 = 16 \cdot 9$$
$$256 = 16 \cdot 16$$
$$400 = 16 \cdot 25$$

   Then, she noticed that 1, 4, 9, 16, and 25 are $1^2, 2^2, 3^2, 4^2$ and 5^2.

   a. Use Jada's observations to predict the distance fallen after 7 seconds. (Assume the building is tall enough that an object dropped from the top of it will continue falling for at least 7 seconds.) Show your reasoning.

   b. Write an equation for the function, with d representing the distance dropped after t seconds.

3 Galileo and Gravity

Student Task Statement

Galileo Galilei, an Italian scientist, and other medieval scholars studied the motion of free-falling objects. The law they discovered can be expressed by the equation $d = 16 \cdot t^2$, which gives the distance fallen in feet, d, as a function of time, t, in seconds.

An object is dropped from a height of 576 feet.

1. How far does it fall in 0.5 seconds?

2. To find out where the object is after the first few seconds after it was dropped, Elena and Diego created different tables.

Elena's table:

time (seconds)	distance fallen (feet)
0	0
1	16
2	64
3	
4	
t	

Diego's table:

time (seconds)	distance from the ground (feet)
0	576
1	560
2	512
3	
4	
t	

a. How are the two tables are alike? How are they different?

b. Complete Elena's and Diego's tables. Be prepared to explain your reasoning.

Activity Synthesis